Stepwise Progression in Mechanical Spinal Distraction Does not Induce Increases in Muscle Activity

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Context: Spinal distraction has been used to treat cervical and lumbar conditions, however standards for progression phases of treatment have not been well reviewed or established. Increasing distance between points of muscle attachment may increase muscle activation, thereby creating an adverse response to treatment and reducing effectiveness. Objective: The purpose of this research was to determine if a linear stepwise progression could be accomplished without increases in muscle activity in the lumbar paraspinals during low intensity mechanical spinal distraction. Design: The study was a single trial within subject design. Setting: The study took place in the clinical laboratory of the Athletic Training Education Program at a University. Subjects: Subjects (n = 9) were men and women healthy volunteers from the student population of the Sport & Movement Science Department at the University. All subjects were screened for contraindications as well as previous history of recent low back pain or injury, less than one year. Interventions: Subjects were secured to a low coefficient lumbar spinal distraction system in the prone position. All subjects received the same progression phases of 6.06kg per step for three steps to reach a total of 18.18kg of final distraction force. Each step had a hold of 10 seconds with a slow motor pull during transition. Main Outcome Measures: Electromyography of the right lumbar paraspinals were collected for 3 seconds and averaged, in standing (for comparison), lying prone on distraction table prior to distraction force application and immediately after reaching maximal distraction force of 18.18kg. Paired t-test were used to determine effect, if any, of spinal distraction treatment force following stepwise progression. Results: The mean RMS for lumbar paraspinals was 0.00971+ 0.00518V, 0.00581+ 0.00073V, and 0.00505+ 0.00071V for standing, prone pre distraction and prone post stepwise distraction, respectively. There was a significant difference between standing and both prone conditions, (pre- p = 0.022 and post- p = 0.021) however no significant difference in pre compared to post distraction in the prone position (p = 0.147). Conclusions: There was no significant increase in muscle activity following the distraction force of 18.18kg in the lumbar paraspinals. Stepwise progression for lumbar paraspinals distraction may be a consistent method of applying spinal distraction and assuring there is no increase in resistance to treatment.